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ORIGINAL RESEARCH ARTICLES

Free Open Access Medical Education resource knowledge and utilisation amongst Emergency Medicine trainees: A survey in four countries



Connaissance et utilisation des ressources en enseignement médical gratuit en accès libre chez les stagiaires en médecine d'urgence: une enquête dans quatre pays

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Introduction

Free Open Access Medical Education encompasses a broad array of free online resources and discussion fora. The aim of this paper was to describe whether Emergency Medicine trainees in different contexts know about Free Open Access Medical Education, whether or not they know about its different platforms, which ones they use, and what the major barriers to regular usage are.

Methods

A convenience sample was surveyed on awareness and use of Free Open Access Medical Education blogs, podcasts, websites and Twitter at three institutions (in Australia, Botswana and Papua New Guinea) and one deanery (United Kingdom) between June 2013 and June 2014 using an online survey tool or via hand-distributed survey.

Results

44 trainees responded: four from Botswana, seven from Papua New Guinea, ten from the United Kingdom and 23 from Australia. 82% were aware of blogs, 80% of websites, 75% of podcasts and 61% of Twitter as resources in Emergency Medicine. Awareness and use of specific resources were lower in Botswana and Papua New Guinea. For blogs, podcasts and websites, trainees who had looked at a resource at least once were neutral or agreed that it was relevant. For Twitter, some trainees found it difficult to navigate or not relevant. Lack of awareness of resources rather than lack of internet access was the main barrier to use.

Conclusion

The Emergency Medicine trainees in both developed and low resource settings studied were aware that Free Open Access Medical Education resources exist, but trainees in lower income settings were generally less aware of specific resources. Lack of internet and device access was not a barrier to use in this group.

Introduction: L'enseignement médical gratuit en accès libre englobe un large éventail de ressources et forums de discussion gratuits en ligne. Les objectifs de cette étude sont de décrire si les stagiaires en médecine d'urgence dans différents contextes ont connaissance de l'enseignement médical gratuit en accès libre, s'ils ont ou non ils ont connaissance de ses différentes plateformes, quelles sont celles qu'ils utilisent et quels sont les principaux obstacles à leur utilisation régulière.

Méthodes: Une enquête a été menée sur un échantillon de commodité sur la sensibilisation aux blogs, podcasts, sites Internet et comptes Twitter sur l'enseignement médical gratuit en accès libre et leur utilisation, dans trois établissements (en Australie, au Botswana et en Papouasie-Nouvelle-Guinée) et un doyenné (Royaume-Uni) entre juin 2013 et juin 2014, en utilisant un outil d'enquête en ligne ou par le biais d'un questionnaire distribué en personne.

Résultats: 44 stagiaires ont répondu: quatre provenant du Botswana, sept de Papouasie-Nouvelle-Guinée, dix du Royaume-Uni et 23 d'Australie. 82% connaissaient les blogs, 80% les sites, 75% les podcasts et 61% les comptes Twitter en tant que ressources en médecine d'urgence. La sensibilisation et l'utilisation de ressources spécifiques étaient plus faibles au Botswana et en Papouasie-Nouvelle-Guinée. Concernant les blogs, les podcasts et les sites Web, les stagiaires qui avaient consulté une ressource au moins une fois en avaient une opinion neutre ou convenaient qu'elle était pertinente. Concernant Twitter, certains stagiaires ont trouvé qu'il était difficile d'y naviguer ou estimaient le service non pertinent. Le principal obstacle à l'utilisation était le manque de sensibilisation aux ressources plutôt que le manque d'accès à Internet.

Conclusion: Les stagiaires en médecine d'urgence interrogés dans les pays développés comme dans les contextes à faibles ressources étaient conscients de l'existence de ressources en enseignement médical gratuit en accès libre, mais les stagiaires dans les contextes à faible revenu étaient généralement moins conscients des ressources spécifiques. Le manque d'accès à Internet ou à des appareils n'était pas un obstacle à l'utilisation au sein de ce groupe.

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African relevance

- Emergency Medicine training programmes are increasing in number in Africa.
- Free Open Access Medical education may be a useful tool in low- and middle-income countries' emergency medical training.

1. Introduction

In 2012, a movement was coined amongst Emergency Medicine (EM) and critical care practitioners as Free Open Access Medical education (FOAM), also known by the Twitter hashtag #FOAMed.^{1,2} It encompasses a broad array of free online resources and discussion fora aimed at breaking down traditional barriers to knowledge translation³ and facilitating online dialogue between practitioners who otherwise would not have the chance to interact.

The FOAM concept started with a small sector of practitioners and is now embraced more broadly by the mainstream. Its acceptance is such that the journal Emergency Medicine Australasia has devoted a regular section to 'social media' where selected FOAM content will be represented in the journal on a monthly basis.^{4,5}

A further global discussion now occurring is around how to best teach and practice evidence based Emergency Medicine in low resource settings.^{6–8} This challenge is being raised by an increasing number of emergency physicians as the speciality grows globally and training programmes are flourishing in low- and middle-income countries (LMICs). Emergency Medicine training programmes are now underway in Botswana,⁹ Papua New Guinea (PNG),¹⁰ Myanmar,¹¹ Tanzania,¹² Ghana¹³ and many more countries each with their own contexts and challenges.

Most Emergency Medicine textbooks have been written for practice in developed countries and do not address best practice in lower resource settings. Journals are not universally available to trainees due to cost and relevant information is not easily located amongst the thousands of articles published daily. These resources also may not address patient presentations and issues frequently encountered in resource-constrained settings, where 'best practice' care may simply not be achievable.

FOAM is a phenomenon that could potentially support trainees all over the world and could address some of these issues. At present, though, most of what is available via FOAM is focused on care delivery in developed contexts.

The aims of this paper were to describe whether Emergency Medicine trainees in different resource contexts know about FOAM, whether or not they know about different FOAM platforms, which ones they use, and what the major barriers to regular usage are.

2. Methods

A convenience sample of all Emergency Medicine trainees in four institutions connected to the authors was approached to participate. The participants worked at hospitals in three cities and one deanery in four countries, namely, the United Kingdom (UK), Australia, Botswana and PNG, between June 2013 and June 2014. 100% of all of Botswana's trainees were offered the chance to participate, with 58% of trainees in PNG at the time and much smaller samples approximating <1% of trainees in the UK and Australia. A much larger, more representative sample size would have been optimal but was logistically difficult given the geographical spread of potential participants. Participants were questioned about their knowledge, attitudes and practice relating to resources available under the umbrella term FOAM.

Table 1 Content of Free Open Access Medical education (FOAM) resources and country of origin.

FOAM type	Content/focus	Country of origin
<i>Blogs</i>		
Emcrit ^{20*}	EM and critical care	US
Life in the Fast Lane ²¹	EM and critical care	Australia
St Emlyn's ^{22*}	EM topics	UK
Academic Life in Emergency Medicine ¹⁹	EM topics	US
Broomedocs ^{23*}	Rural and remote practice	Australia
<i>Podcasts</i>		
The Ultrasound Podcast ²⁴	Bedside EM ultrasound	US
SmartEM ²⁵	EBM in EM	US
ERCast ²⁶	EM topics	US
Pre-Hospital And Retrieval Medicine ²⁷	Pre-hospital and retrieval topics	Australia
The Skeptic's Guide to Emergency Medicine ³	EBM in EM	Canada
<i>Websites</i>		
The Global Medical Education Project ²⁸	Exam and resource website for EM and Critical Care	Australia
Radiopaedia ²⁹	Radiology website	Australia
The African Federation for Emergency Medicine ³⁰	EM in Africa	South Africa
Amal Mattu's ECG website ³¹	ECGs and cardiology	US
Official College of Emergency Medicine website, local or nearby	EM from training perspective	Various

FOAM, Free Open Access Medical education; EM, emergency medicine; EBM, evidence-based medicine; ECG, electrocardiogram; US, United States of America; UK, United Kingdom.

* Also a podcast.

The survey was distributed either via a link to the online survey tool SurveyMonkey (www.surveymonkey.com; Palo Alto, California) delivered by email (Australia and the UK) or distributed by hand as a paper survey (PNG and Botswana). All responses were included in the analysis.

The survey consisted of the following six sections: demographics, blogs, podcasts, Twitter, websites, and awareness and usage. Response type varied depending on the question and included: yes/no, multiple choice, Likert scales,¹⁴ and open response.

Participants were questioned on a sample of five blogs, five podcasts and five websites (Table 1) known and used by one or more of the authors. The selected blog and podcast examples are all listed in the *Life in the Fast Lane* website FOAM blog and podcast databases^{15,16} and come from the UK, Canada, the United States (US) and Australasia. Blogs and podcasts on Emergency Medicine originating from low resource countries at the time of writing the survey (May 2013) were searched for using the search engines www.google.com and www.google-FOAM.com but none were found. The African Federation of Emergency Medicine website was included. Several resources fall into more than one category, e.g. both a blog and a podcast, but were only evaluated in one category. Participants were asked to list any other blogs, podcasts or websites they used in an open question at the end of each section.

Participants were asked about awareness, frequency and ease of use of resources using Likert scales. Open questions with free-text were used to find out whether participants were using any resources not listed. Reasons for not using a resource were evaluated using multiple choice with a free-text 'other' option.

Results were downloaded from the online survey tool into an Excel spreadsheet (Microsoft Corp, v.14.4.9 2011, Washington, USA) and handwritten responses were added by hand. Spreadsheet data were then exported to SPSS (Version 22, SPSS Inc., Chicago, Illinois) for analysis.

This study met the ethical standard for all four institutions at which the survey was distributed and had formal ethics review by The University of Botswana and The Townsville Hospital Ethics Committee, which classified it as low-risk (HREC/13/QTHS/191 Townsville). All data were anonymously collected and reported.

3. Results

Forty-four trainees responded of which 23 (52%) were undergoing training in Australia, ten (23%) in the UK, seven (16%) in PNG and four (9%) in Botswana. 100% of trainees offered the chance to participate in Botswana, PNG and Australia completed the survey. The response rate in the UK was 23% (10 out of 44 trainees). The mean age of respondents was 33 years (SD \pm 3.9 years), 30 (68%) were male and 14 (32%)

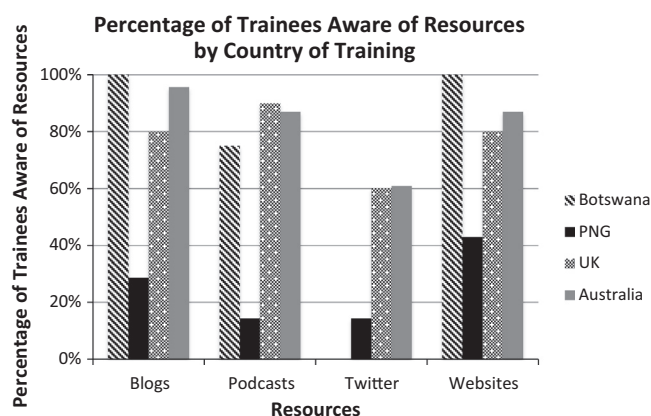


Figure 1 Percentage of trainees aware of resources by country of training. PNG, Papua New Guinea; UK, United Kingdom.

female. The median year of passing the primary exam or equivalent was 2012 and ranged from 2000 to 2014 (see Table 2 and Fig. 1)

Most trainees were aware of the existence of blogs pertaining to medical education with 36 (82%) of respondents aware of these resources. *Life in the Fast Lane* was the most well-known of the five blogs included in the survey as everyone who knew blogs existed had heard of it and 31 (70%) of the 44 respondents reported using it rarely ($n = 5$; 11%), sometimes (i.e. 1–2 \times per month) ($n = 13$; 30%), every week ($n = 12$; 27%) or as their first point of information ($n = 4$; 9%). Most respondents 32 (72%) agreed or strongly agreed it was relevant to their practice.

For those who had looked at specific blogs at least once, all either felt neutral, agreed or strongly agreed with the statement that the given blogs were relevant to their practice. No trainees who had looked at the sites disagreed or did not respond.

Additional blog resources reportedly used by participants were as follows: resus.me (Australian critical care blog), Dr. Smiths ECG blog (US ECG blog), Scancrit (Scandinavian critical care blog), Trauma Professionals blog (US trauma blog), and Emergency Medicine Literature of Note (US EM blog).

Table 3 shows overall usage of specific resources by country of training.

Thirty-five (80%) respondents were aware of websites pertaining to Emergency Medicine training. The websites used by the most respondents were emergency medicine training college websites with 26 (59%) respondents using them rarely ($n = 11$; 25%), sometimes ($n = 11$; 25%) or every week ($n = 4$; 9%). Amal Mattu's ECG website was the second most used website ($n = 13$; 30%). However, eleven (25%) respondents had never heard of it. *Radiopaedia* was used by 8 (18%) respondents, but 27 (61%) and 25 (57%) had never heard of the African Federation for Emergency Medicine or The Global Medical Education Project (GMEP), respectively. It should be noted that since the survey, GMEP has been taken offline, but was active at the time the survey was conducted. As with blogs, trainees who had looked at the websites surveyed were either neutral, agreed or strongly agreed that these resources were relevant to their practice.

Additional website resources reportedly used by participants were as follows: *Improving ED Care* (New Zealand

Table 2 Gender mix of trainees per country.

Country	Male ($n = 29$)	Female ($n = 14$)
Botswana	4	0
Papua New Guinea	6	1
United Kingdom	6	4
Australia	13	9

Table 3 Proportion of participants using a resource more than once.

FOAM type	Resource	Botswana (%)	PNG (%)	UK (%)	Australia (%)	Total (%)
Blogs	Emcrit	0	0	50	70	43
	LITFL	100	29	60	96	80
	ALiEM	0	0	40	17	9
	St Emlyn's	0	0	50	13	16
	Broomedocs	0	0	10	9	7
Websites	GMEP	0	0	20	4	5
	Radiopaedia	25	14	50	48	18
	AFEM	25	0	10	0	0
	Amal Mattu	0	14	50	57	30
	College website	100	0	60	70	34
Podcasts	Ultrasound	25	0	20	22	9
	SmartEM	25	0	10	13	7
	ER Cast	0	0	20	13	9
	PHARM	0	0	20	13	11
	SGEM	25	0	10	0	5

FOAM, Free Open Access Medical education; PNG, Papua New Guinea; UK, United Kingdom; LITFL, *Life in the Fast Lane*; ALiEM, *Academic Life in Emergency Medicine*; GMEP, The Global Medical Education Project; AFEM, African Federation for Emergency Medicine; PHARM, *Pre-Hospital And Retrieval Medicine*; SGEM, *The Skeptic's Guide to Emergency Medicine*.

website collating EM FOAM) and *iMeducate* (Australian EM exam-based website).

Thirty-three (75%) respondents were aware of the existence of free podcasts for medical education though use was limited. The most popular podcast was *The Ultrasound Podcast* with nine (20%) respondents using it rarely ($n = 4$; 9%), sometimes ($n = 3$; 7%), weekly ($n = 1$; 2%) or as first point of information ($n = 1$; 2%). *Pre-Hospital And Retrieval Medicine* had five respondents who indicated they used it sometimes ($n = 2$; 5%) or weekly ($n = 3$; 7%). None of the PNG trainees reported using podcasts in their learning.

Additional podcast resources reportedly used by participants were as follows: *Resuscitationist's Awesome Guide to Everything* (RAGE) (UK/Australia/US critical care podcast), *EM Basic* (US EM podcast) and *EM:RAP* (paid US EM podcast).

Familiarity and use of Twitter as a resource in EM was lower than with other resources: four (100%) Botswana trainees, six (86%) PNG trainees, four (40%) UK trainees and 9% (39%) of Australian trainees surveyed had not heard of Twitter as a resource for Emergency Medicine education. In terms of use, two (5%) trainees were using it rarely, four (9%) sometimes, four (9%) every week and no trainees were using Twitter as their first point of information.

Amongst those who had looked at Twitter as a resource in EM at least once, one (10%) UK user and two (9%) Australian users strongly disagreed that it was easy to find the information they were looking for, whilst two (20%) UK and three (13%) Australian trainees disagreed. Four (17%) Australian trainees were neutral with three (13%) agreeing, along with two (20%) UK trainees and one (14%) PNG trainee. One (10%) UK trainee and one (4%) Australian trainee strongly agreed that it was easy to find the information they were looking for on Twitter.

Of those who had looked at Twitter as a resource in EM, one (4%) Australian and two (20%) UK trainees disagreed with the statement, 'Twitter is relevant to my practice', whilst two (9%) Australian trainees and one (10%) UK trainee were

neutral. One (14%) trainee from PNG agreed with the statement, as did one (10%) UK trainee and three (13%) Australian trainees. Two (20%) UK trainees and one (4%) Australian trainee strongly agreed that Twitter was relevant to their practice.

For blogs, one (10%) UK trainee stated they did not have regular access to a computer/tablet/smartphone, whilst no other trainees reported this or limited internet access as the reason they were not accessing blogs. One (25%) Botswana trainee, one (10%) UK trainee and two (9%) Australian trainees found that blogs were not easy to navigate, whilst three (13%) Australian trainees (but no other trainees) did not trust the content. Reasons for not using podcasts demonstrated a similar distribution, though one (25%) Botswana trainee reported lack of regular access to the internet as the reason why they were not listening to podcasts. One (4%) Australian trainee found that podcasts are not easy to navigate and two (20%) UK trainees and two (9%) Australian trainees did not trust the content. Lack of use of websites showed a similar distribution with no trainees reporting lack of access to the internet or a device as a barrier to use.

Twenty-eight (63.6%) trainees were using textbooks for self-directed learning, including all those from Botswana and PNG. Twenty-four (54.5%) were using journals, again including all those from Botswana and PNG.

Two trainees (5%) disagreed that the survey had increased their awareness of FOAM resources. Six trainees (14%) were neutral and 36 (82%), including all those from lower income countries, agreed or strongly agreed that the survey had increased their awareness of FOAM resources.

4. Discussion

We conducted a small survey of a convenience sample of EM trainees in four countries asking about participants' awareness and use of FOAM resources between June 2013 and June 2014. Blogs were the most recognised FOAM resource, with *Life in the Fast Lane* being the most popular example. Websites were

the second most recognised resource (80%), then podcasts (75%) and finally Twitter (61%). Our study showed 75% of participants were aware of podcasts but there were low numbers of users of specific podcasts, e.g. nine (20%) used *The Ultrasound Podcast*.

Podcasts were reported to be beneficial in extra-curricular learning¹⁷ by 70.3% of US Emergency Medicine residents previously surveyed by Mallin et al. Comparing the current study and the Mallin study shows that 54.3% of US respondents endorsed textbooks as beneficial in extra-curricular learning whilst 63.6% did in our study. Disaggregated results show 100% of participants from lower income countries used textbooks as a primary resource in self-directed learning suggesting a paradigm shift in approach in US trainees and possibly trainees in other higher resourced contexts. The possible reasons for this potential difference are varied and complex, yet include access to different technologies, reliability of technologies in low- and middle-income countries (LMICs), cost, varied pedagogies and cultural differences. There may be other motivations for preferring to use textbooks around perceptions of reliability, though these concerns are not likely to be limited to trainees in LMICs.

Trainees were neutral or agreed that the resources were relevant to their practice if they had looked at the resource. Twitter was the exception, as it is perhaps more difficult to manage and filter as a tool in EM learning. The main barrier for using FOAM resources in both high- and low-income countries was lack of awareness of the specific resources available. However, lack of awareness was more prevalent amongst the trainees from PNG and Botswana and may reflect isolation from an extensive network of EM practitioners or lack of opportunities to attend conferences and meetings where such resources might be mentioned.

We found that internet and device access were generally not barriers amongst the trainees surveyed, including those in low-income nations with only one trainee in Botswana citing it as a reason that they did not use podcasts. This may be an important finding; if trainees in LMICs do not consider internet access a barrier to accessing information, then FOAM resources have the potential to be a significant support to training. However, it is difficult to interpret this finding in this small sample size and further investigation may reveal internet access to be an issue for some LMIC trainees.

A small number of trainees who were not using specific resources cited they did not trust the content of FOAM resources. This is reflected in the mainstream discussion on FOAM, with concern about reliability of content that is not peer-reviewed being voiced by practitioners. Proponents of FOAM counter this argument by pointing out the fallibility of peer review,¹ but the discussion is ongoing and it is unsurprising that it is reflected in the trainees surveyed here. To mitigate this issue, the Australasian College of Emergency Medicine (ACEM) has started a 'Best of Web' section whereby fellows and trainees of the college review FOAM content for the ACEM website¹⁸ and *Academic Life in Emergency Medicine* has a peer-review process prior to publication of entries on the website.¹⁹

A further outcome of this study is that it raised awareness of specific FOAM resources amongst almost all the trainees surveyed. A follow-up survey may indicate greater FOAM resource use. The FOAM movement is a dynamic phenomenon, awareness and use of which is increasing and

has likely increased in some or all populations of trainees in the time since the survey was conducted. Future work could involve a much larger survey including trainees from many more countries. Based on the interest from trainees in lower resourced settings demonstrated in this study, a FOAM platform aimed at LMIC trainees could be piloted and reported.

This study cannot be considered representative of trainees in any country (apart from Botswana, where all EM trainees at the time of the survey were surveyed) due to the small number of participants. Selection bias is inherent in the design as this was a convenience sample of trainees from institutions associated with one or more of the authors. Only urban trainees were sampled which adds to the lack of generalisability.

The Emergency Medicine trainees in both developed and low resource settings studied here were aware that Free Open Access Medical Education resources exist, but trainees in lower income settings were generally less aware of specific resources. Lack of internet and device access was not a barrier to use in this group.

Conflict of interests

The authors declare no conflict of interests. This study received no specific funding.

Dissemination of results

Results from this study are planned to be shared with participants at all institutions via informal presentation in the near future.

Author contribution

N.T. designed the study, drafted the manuscript, and administered the survey in Botswana and Australia. C.B. administered the survey in Australia and edited the manuscript. M.C. contributed to study design, administered the survey in Botswana and edited the manuscript. T.P. edited the manuscript and contributed to the analysis. J.F. contributed to study design and edited the manuscript. All authors approved the final version.

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References

1. Nickson CP, Cadogan MD. Free Open Access Medical education (FOAM) for the emergency physician. *Emerg Med Australas* 2014;26:76–83.
2. Life in the Fast Lane page on 'FOAM'. Available from URL <<http://lifeinthefastlane.com/foam/>>; Dec 2014 accessed January 2015.
3. The Skeptics Guide to Emergency Medicine Podcast. Available from URL <<http://thesgem.com>>; March 2015 accessed January 2015.

4. Hughes G. A fresh look. *Emerg Med Australas* 2014;**26**:99.
5. Scott KR, Hsu CH, Johnson NJ, et al. Integration of social media in emergency medicine residency curriculum. *Ann Emerg Med* 2014;**64**(4):396–404.
6. Becker TK, Jacquet GA, Marsh R, et al. Global Emergency Medicine Literature Review (GEMLR) Group. Global emergency medicine: a review of the literature from 2013. *Acad Emerg Med* 2014;**21**(7):810–7.
7. Hodkinson PW, Wallis LA. Emergency medicine in the developing world: a Delphi study. *Acad Emerg Med* 2010;**17**(7):765–74.
8. Cohen KL, Wallis LA. Is the current South African emergency medicine curriculum fit for purpose? An emergency medicine practice analysis. *Emerg Med J* 2011;**28**(11):955–8.
9. Caruso N, Chandra A, Kestler A. Development of emergency medicine in Botswana. *Afr J Emerg Med* 2011;**1**(3):108–12.
10. Curry C, Annerud C, Jensen S, et al. The first year of a formal emergency medicine training programme in Papua New Guinea. *Emerg Med Australas* 2004;**16**(4):343–7.
11. Phillips GA, Soe ZW, Kong JH, et al. Capacity building for emergency care: training the first emergency specialists in Myanmar. *Emerg Med Australas* 2014;**26**:618–26.
12. Reynolds TA, Mfinanga JA, Sawe HR, et al. Emergency care capacity in Africa: a clinical and educational initiative in Tanzania. *J Public Health Policy* 2012;**33**(Suppl. 1):S126–37.
13. Martel J, Oteng R, Mould-Millman NK, et al. The development of sustainable emergency care in Ghana: physician, nursing and prehospital care training initiatives. *J Emerg Med* 2014;**47**(4):462–8.
14. Likert R. A technique for the measurement of attitudes. *Arch Psychol* 1932;**140**.
15. Life in the Fast Lane 'FOAM blog database' Available from URL <<http://lifeinthefastlane.com/resources/emergency-medicine-blogs/>>; March 2015 Accessed October 2014.
16. Life in the Fast Lane 'FOAM podcast database', Available from URL <<http://lifeinthefastlane.com/resources/podcasts/>>; January 2015 Accessed October 2014.
17. Mallin M, Schlein S, Doctor S, et al. A survey of the current utilization of asynchronous education among emergency medicine residents in the United States. *Acad Med* 2014;**89**(4):598–601.
18. Australasian College of Emergency Medicine Best of Web Reviews, Available at URL <<https://www.acem.org.au/Resources/Educational-resources/Best-of-Web-EM-reviews.aspx>>; April 2015 Accessed March 2015.
19. Academic Life in Emergency Medicine blog website, Available from URL <www.aliem.com>; April 2015 Accessed October 2014.
20. Emcrit blog/podcast website. Available from URL <<http://emcrit.org>>; April 2015 Accessed May 2013.
21. Life in the Fast Lane blog website, Available from URL <<http://lifeinthefastlane.com>>; April 2015 Accessed May 2013.
22. St Emlyn's blog website: Available from URL <<http://stemlyns-blog.org>>; April 2015 Accessed May 2013.
23. Broomedocs blog website, Available at URL <<http://broomedocs.com>> April 2015 Accessed June 2014.
24. The Ultrasound Podcast website Available at URL <www.ultrasoundpodcast.com>; April 2015 Accessed May 2013.
25. The SmartEM podcast website (updated September 2014) Available at URL <www.smartem.org> Accessed May 2013.
26. ERCast podcast website (updated April 2015) Available at URL <<http://blog.ercast.org>> Accessed May 2013.
27. Pre-Hospital And Retrieval Medicine (PHARM) podcast, Available at URL <www.prehospitalmed.com>; April 2015 Accessed May 2013.
28. The Global Medical Education Project (no longer available) was available at URL <www.gmep.org> Accessed May 2013.
29. Radiopaedia website (updated April 2015) Available at URL <www.radiopaedia.org> Accessed May 2013.
30. African Federation of Emergency Medicine (updated April 2015) Available at URL <www.afem.info> Accessed May 2013.
31. Amal Mattu's ECG website, Available at URL <<http://www.mededmasters.com/ecg-lessons-by-amal-mattu.html>>; April 2015 Accessed May 2013.